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Surface-Water Sampling For Analysis Of Actinide Particle-Size Distribution At The Rocky Flats Environmental Technology Site

Sampling Plan



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**SURFACE-WATER SAMPLING FOR ANALYSIS OF
ACTINIDE PARTICLE-SIZE DISTRIBUTION AT THE
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE**

SAMPLING PLAN

August 1998
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TABLE OF CONTENTS

1	PURPOSE	3
2	SCOPE	4
3	ORGANIZATIONAL RESPONSIBILITIES	5
4	SAMPLING LOCATION	7
5	SAMPLING PROTOCOL	8
6	DATA MANAGEMENT	9
7	QUALITY ASSURANCE	10
8	RECORDS GENERATED	10
9	HEALTH AND SAFETY	11
10	APPROVALS	12

FIGURES

Figure 2 —Locations of Rocky Flats Environmental Technology Site Gaging Stations, Sub-Basins, and Watersheds	6
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1. PURPOSE

The purpose of this field sampling plan is to provide a framework for conducting specialized surface-water sample processing and analysis for detention pond discharge waters from the Rocky Flats Environmental Technology Site (Site) to support the Actinide Migration Studies (AMS). An important AMS objective is to determine how plutonium and americium activity is distributed among the sizes of suspended solids (particles) that are transported in Site surface water. This information is important input for modeling actinide transport in Site streams.

The AMS is being implemented to investigate the mobility of plutonium, americium, and uranium in the Site environment. The goal of the AMS is to answer the following questions in the order of urgency shown:

- 1 **Urgent** What are the important actinide migration sources and migration processes that account for recent surface water quality standard exceedances?
- 2 **Near Term** What will be the impacts of actinide migration on planned remedial actions? To what level do sources need to be cleaned up to protect surface water from exceeding action levels for actinides?
- 3 **Long Term** How will actinide migration affect surface water quality after Site closure? In other words, will soil Action Levels be sufficiently protective of surface water over the long term?
- 4 **Long Term** What is the long term off-site actinide migration, and how will it impact downstream areas (e.g., accumulation)?

These questions will be answered by mathematical modeling of actinide transport processes to predict actinide loads attributed to known sources of actinides in the Site environment. Actinide loading information is needed to calibrate the models, verify modeling results, and evaluate the error of estimation for the models.

The actinide transport models will estimate the quantities of actinides transported to surface water via the environmental pathways listed below:

- Runoff / Diffuse Overland Flow
- Surface Water Flow (Channeled)
- Groundwater Transport - both saturated and unsaturated

- Interflow (i.e. near surface, saturated flow)
- Airborne Transport

Information on particle-size distribution of actinides in surface water will be used to address the Channeled Surface Water Flow transport pathway and the unsaturated groundwater transport pathway

2. SCOPE

This sampling plan calls for the collection of detention pond discharge samples at gaging station GS03 located on Walnut Creek at Indiana Street. Water measured at this station is representative of hydrologic conditions that are expected to exist in the near term and long term Site detention ponds and hydrologic management configurations (Figure 1). Activity observed in Site surface water is typically below detection at baseflow, especially at GS03. In 1997, water samples at GS03 indicated actinide activities higher than the Site-specific discharge standard of 0.15 pCi/L. Sampling at GS03 for AMS research projects could lead to management strategies for controlling actinide source material that could be causing the observed water-quality exceedances.

This plan covers the following items associated with field sampling of pond discharge waters for the analysis of actinide particle-size distribution:

- Organizations responsible for conducting sampling,
- Sampling locations,
- Field sampling protocol,
- Sampling schedule,
- Sample containerization, shipping, and disposition, and
- Records

This plan does not cover the sample processing, radiochemical analysis, or data interpretation associated with the evaluation of the actinide particle-size distribution. However, the samples are planned to be processed by CSM / TAMU using tangential flow ultra-filtration (TFF) techniques as soon as possible, and sample handling, preservation requirements, and transportation logistics described herein are designed to accommodate the TFF processing.

3. ORGANIZATIONAL RESPONSIBILITIES

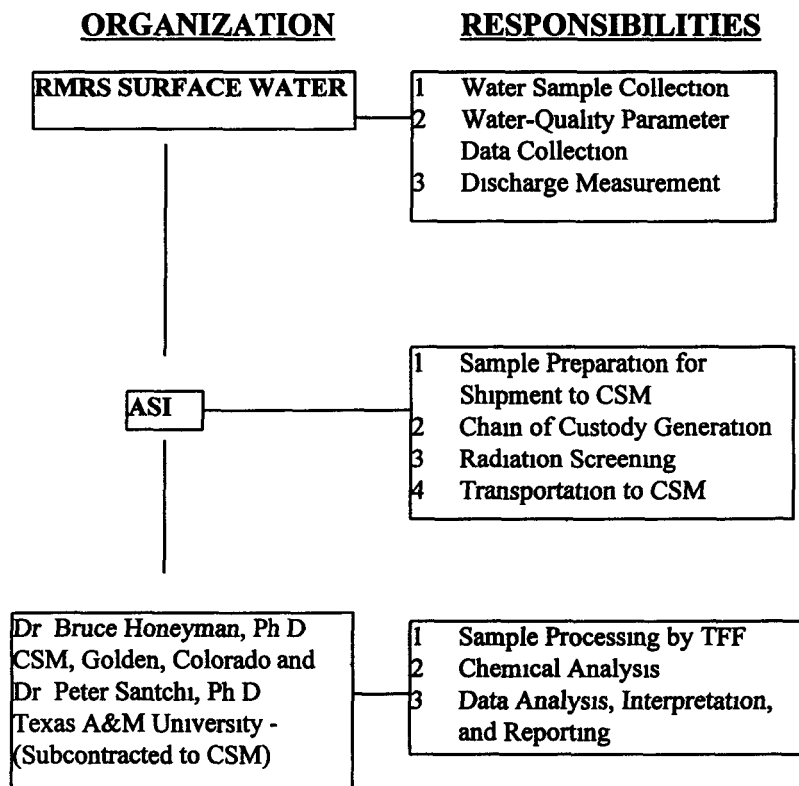
Site detention pond discharge sampling is conducted by RMRS Surface Water personnel, assisted by extended staff support provided by Advanced Sciences, Inc (ASI), International Engineering, Inc and Wright Water Engineers, Inc. Samples will be collected by RMRS personnel. The samples are transported to ASI, located in Trailer T8910 and placed in ASI custody for field containerization, radiation screening (if applicable) and transportation to analytical laboratories. ASI will generate Chain of Custody documentation for each sample, and they will deliver the samples to Dr. Bruce Honeyman at Coolbaugh Hall at the Colorado School of Mines in Golden, Colorado.

Figure 2.—Locations of Rocky Flats Environmental Technology Site Gaging Stations, Sub-Basins, and Watersheds.

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Figure 2 outlines the organizational responsibilities for the field sampling operation

Figure 2. Organizational Responsibilities for Detention Pond Discharge Sampling is Support of AMS Research.



4. SAMPLING LOCATION

Sampling location GS03 was selected for collection of the detention pond discharge samples (Figure 1). This sampling location has a continuously recording stream gaging station where samples are routinely collected for compliance with the Rocky Flats Cleanup Agreement (RFCA). Discharge measured at this station comes from controlled detention pond discharges from Pond A-4 and Pond B-5 combined with local overland runoff predominantly from undisturbed range land. In addition, some flow at GS03 is generated from the landfill area. The sampling will be conducted during a scheduled pond discharge.

5. SAMPLING PROTOCOL

Large volumes of water are needed to collect particulates by TFF for radiochemical analysis. Therefore, grab samples consisting of at least 30 liters each will be collected in the early morning hours for several days during a scheduled pond discharge. The samples will be delivered to researchers at CSM by noon to allow enough time to process the samples with the TFF equipment. The total volume processed with the TFF equipment is expected to be between 100 and 300 liters. Samples will be collected during the period of August 26 to September 4, 1998.

Carbon-free containers are preferred to prevent contamination of the sample for dissolved organic carbon analysis. Glass containers can produce leached silica that can shield alpha radiation in the water sample, and Teflon containers are cost prohibitive. Consequently, polyethylene containers rinsed with deionized water will be used, or they will be lined with Teflon bags.

The water samples will be packed in coolers in ice at a temperature of 4 °C. These coolers will be transported to CSM as soon as possible to prevent aggregation of particles in the samples. Collection of water-quality field parameter data, stream discharge data, and water samples will be done according to the RMRS Standard Operating Procedures in Table 1.

Table 1. RMRS Standard Operating Procedures Applicable to AMS Surface-Water-Sampling Activities.

PROCEDURE NUMBER	TITLE
5-21000-OPS-SW 01	Surface Water Data Collection Activities
5-21000-OPS-SW 02	Field Measurements of Surface Water Field Parameters
5-21000-OPS-SW 03	Surface Water Sampling
5-21000-OPS-SW 04	Discharge Measurement
5-21000-OPS-SW 10	Event-Related Surface Water Sampling
5-21000-OPS-SW 11	Operation and Maintenance of Stream-Gaging and Sampling Stations

Field preparation of samples for off-site shipment, record keeping, and decontamination procedures applicable to the AMS sampling activities are listed in Table 2. The sample containers will be labeled and sealed with evidence tape (custody seal) to indicate any potential tampering.

Table 2. RMRS Standard Operating Procedures Applicable to Field Operations for the AMS Sampling Activities.

PROCEDURE NUMBER	TITLE
2-G18-ER-ADM-17 01	Records Capture and Transmittal
2-S47-ER-ADM-05 14	Use of Field Logbooks and Forms
5-21000-OPS-FO 03	Field Decontamination Operations
5-21000-OPS-FO 6	Handling of Personal Protective Equipment
5-21000-OPS-FO 7	Handling of Decontaminated Water and Waste Water
5-21000-OPS-FO 09	Handling of Residual Samples
5-21000-OPS-FO 10	Receiving, Labeling, and Handling Environmental Material Containers
5-21000-OPS-FO 11	Field Communications
5-21000-OPS-FO 13	Containerization, Preserving, Handling and Shipping of Soil and Water Samples
5-21000-OPS-FO 16	Field Radiological Measurements
5-21000-OPS-FO 18	Environmental Sample Radioactivity Content Screening
5-21000-OPS-FO 20	Sampling of Environmental Containers
5-23000-WRP-WO-1101	Solid Radioactive Waste Packaging Outside the PA

6. DATA MANAGEMENT

A field logbook will be used during this investigation by both field sampling personnel and RMRS Surface Water staff. The field logbook should include time and date information concerning the field activities. Data for this project will be collected, entered, and stored in a controlled and retrievable environment in accordance with 2-G18-ER-ADM-17 01, *Records Capture and Transmittal*.

7. QUALITY ASSURANCE

Analytical data collected in support of this investigation will be evaluated using the guidance established by the Rocky Flats Administrative Procedure 2-G32-ER-ADM-08 02, *Evaluation of ERM Data for Usability in Final Reports*. This procedure establishes the guidelines for evaluating analytical data with respect to precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters. Data requirements in support of this project were developed using criteria established in *Guidance for the Data Quality Objective Process*, EPA QA/G-4 (EPA 1994). The AMS researchers at CSM and TAMU will control the quality of the analytical data through protocols established in Work Scope Document for Actinide Migration Studies at the Rocky Flats Environmental Technology Site (Honeyman and Santschi, February 6, 1998).

8. RECORDS GENERATED

RMRS Surface Water Group personnel keep a logbook for recording all field activities associated with operation and maintenance of the Site stormwater monitoring stations. Field data for this activity will be logged in the logbook. The logbook entries contain, at a minimum, the station identification, date, time, current flow meter readings, instantaneous stage reading, and automatic sampler operation information. The sampling information is transcribed from the logbook onto a Sample Collection Form and Chain of Custody Form in T8910. The Sample Collection Forms accompany the sample when it is delivered to ASI for processing and shipment. All records are made consistent with the requirements of 2-S47-ER-ADM-05 14 Use of Field Logbooks and Forms. All records will be kept consistent with 2-G18-ER-ADM-05 14.

ASI will record the Sample Collection Form information into their logbooks and into the field data module for the Surface Water and Soils Database (SWD). The sample information is also recorded on the Chain of Custody documentation. The sample information consists of 1) Station location, 2) Date and time that the first sample in the composite was collected, 3) Party that collected the sample, 4) Parameters to be tested, 5) laboratory destination, and 6) Radiation Screen results, if applicable. RMRS keeps its logbook in trailer T893A, and ASI keeps their records in trailer T8910. ASI also keeps copies of the airbills when samples are shipped by overnight courier.

9. HEALTH AND SAFETY

All field operations shall comply with RF/RMRS-97-SWHSP 01, Rev 0, *Health and Safety Plan for the Automated Surface Water Monitoring in Support of the Rocky Flats Clean-Up Agreement and the Industrial Area IM/IRA*,
Dated 08/15/97

10. APPROVALS

William J Burdett 8/25/98
William Burdett Date

Peggy Schreckengast Date

Greg DiGregorio Date

Bates Estabrooks Date

10. APPROVALS

_____	_____	<u>Peggy Schreckengast</u>	<u>8-25-98</u>
William Burdelik	Date	Peggy Schreckengast	Date

_____	_____	_____	_____
Greg DiGregorio	Date	Bates Estabrooks	Date

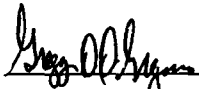
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William Burdelik

Date

Peggy Schreckengast

Date

 RMRS QA

Greg DiGregorio


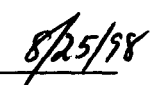
8/25/98

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Bates Estabrooks

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William Burdelik	Date	Peggy Schreckengast	Date
_____	_____		
Greg DiGregorio	Date	Bates Estabrooks	8/25/98 Date

